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# *Conservation Practices To Protect Water Quality*

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COOPERATIVE RECORDS  
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*This booklet is a guide to conservation practices that can help you protect natural resources, especially water. Included are descriptions of conservation practices and an easy-to-use summary guide that lets you compare each practice. Also included is a glossary of water quality factors.*

*As you use this guide, please keep in mind that not all the conservation practices listed may apply to your land. Factors such as soil type, geology, slope, nearness to surface and ground water, and the special needs of your operation should guide your choice of practices.*

*For more information about implementing conservation practices on your land, call or visit the Soil Conservation Service (SCS) office listed in your local telephone directory under United States Government, Department of Agriculture.*

## *Conservation Practices To Protect Water Quality*

Moving water can carry pollutants such as sediment, pesticides, and nutrients from your land and deposit them in surface and ground water. When this happens, water quality problems can arise. Sediment may choke your streams and fill your lakes. Pesticides and chemicals may make your water unusable. Too many nutrients can make unwanted algae grow, robbing animals and other plants of oxygen.

By using the right conservation practice or practices, you can protect soil, water, air, plants, and animals. Agencies of the U.S. Department of Agriculture can help you choose and apply the right conservation practices. The Cooperative Extension System and SCS offer information and technical help. Through conservation districts, SCS can give you technical help with designing and installing your practices. Cost sharing for installation may be available through the Agricultural Stabilization and Conservation Service.

## **Conservation Practices**

Soil and water conservation practices are the most effective and practical ways to prevent or reduce agricultural contamination of water. Described in this section are practices for protecting and improving water quality.



## Management Practices

The following management practices apply to the operation and maintenance of farms and ranches. The right management practices can limit the pollutants removed by runoff or that infiltrate ground water.

### *Nutrient management*

Ensures the nutritional needs of your crop and minimizes losses caused by surface or ground water. Your nutrient management program should include all sources of plant nutrients. Some sources of nutrients are organic wastes, chemical fertilizers, legume crops, soil reserves, and crop residues.

Nutrient management can reduce the loss of nutrients to surface and ground water, maintain soil fertility, supply nutrients for best crop growth, and reduce production costs.

### *Integrated pest management (IPM)*

Controls crop pests through a combination of cultural, biological, and chemical control systems. Crop pests include weeds, insects, and diseases.

IPM can boost plant growth, control targeted pests, reduce pesticide use and related losses to surface and ground water, and reduce your production costs.



### *Irrigation water management*

Controls the rate, timing, and amount of irrigation water applied to your crops. Managing irrigation water ensures that your crops are getting the moisture they need.

Irrigation water management can promote the crop response you want, limit soil ero-

sion, reduce your water use and loss, reduce the movement of fertilizers and pesticides by water, decrease soil salinity, decrease the concentration of toxic trace elements, and conserve energy.



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### *Regulating water in drainage systems*

Controls the removal of surface or subsurface water, usually with water control structures.

Regulating water in drainage systems can reduce soil erosion, maintain best soil moisture conditions, promote crop growth, and reduce nutrient and trace element pollution potential.



### *Soil salinity management*

Manages land, water, and plants to control the accumulation of harmful salts on the surface of the soil or in the root zones of nonirrigated areas.

Soil salinity management can increase soil productivity, decrease salt concentrations in

soil and ground water, control the formation of saline areas, and improve conditions for plant growth.

### *Water table control*

Uses subsurface drains, water control structures, and water conveyance facilities to

remove drainage water and distribute irrigation water.

Water table control can remove excess water, manage ground water for subirrigation, decrease soil salinity, decrease downstream sediment, decrease downstream salinity, and reduce downstream nutrient pollution.



### *Waste management system*

Combines conservation practices to temporarily store wastes for future application to cropland. These wastes include manure, milkroom wash water, and feedlot runoff. Practices may include combinations of wetlands, waterways, diversions, fencing, filter strips, drainage, roof runoff

management, waste storage facilities, waste treatment facilities, and waste utilization.

Agricultural waste management can reduce fertilizer needs, improve the soil, recycle nutrients, reduce potential for spread of disease, and conserve energy.



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### *Runoff management system*

Controls excess runoff caused by changes in land use or other land disturbances.

Runoff management systems can reduce erosion, reduce sediment in watercourses and water bodies, decrease the rate and volume of runoff, decrease the transport of adsorbed chemicals and nutrients, reduce flooding, and improve drainage.



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## Vegetative and Tillage Practices

Vegetation and tillage practices can reduce the movement of pollutants and diminish soil particle detachment by protecting your soil from the adverse effects of wind, rain, and runoff. Though these practices benefit surface water, they may increase the infiltration and movement of soluble nutrients and pesticides to below the root zone.

### *Conservation tillage*

Any tillage or planting method that keeps plant residue on the soil surface during critical erosion periods and reduces the number of tillage operations.

Conservation tillage can reduce soil erosion, improve the soil, save fuel and time, conserve soil moisture, reduce runoff, and increase infiltration.



### *Contour farming*

Tilling, planting, cultivating, and harvesting along the contour of a slope.

Contour farming can reduce soil erosion, conserve soil moisture, cut fuel consumption, increase infiltration, and reduce surface runoff.



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### *Contour stripcropping*

Growing crops in a systematic arrangement of strips or bands along a contour. A strip of grass or close-growing crop is alternated with a cultivated crop.

Contour stripcropping can conserve water, soil, and fertilizer, provide food and cover for wildlife, cut fuel consumption, reduce erosion, reduce surface runoff, and promote cropping rotations.



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### *Filter strip*

A strip or area of land in permanent vegetation established down-slope of agricultural operations.

Filter strips can remove sediment and other pollutants from runoff, control erosion, protect nearby watercourses, and provide diverse wildlife habitat.



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### *Field border*

A strip of perennial vegetation established on the edge of a field. It is planted with herbaceous vegetation or shrubs.

Field borders can control soil erosion, remove sediment and other pollutants from runoff, protect nearby watercourses, reduce

competition from adjacent woodlands, provide food and cover for wildlife, and provide travel lanes for machinery.



9201-14

### *Cover and green manure crop*

Close-growing grasses, legumes, or small grains grown primarily for seasonal soil protection and soil improvement. They are grown for 1 year or less in places where there is no permanent cover.

Cover and green manure crops can reduce soil erosion, improve the soil, provide wildlife habitat, conserve nutrients, and control soil moisture.



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### *Conservation cropping sequence*

Growing crops in a sequence designed to provide adequate organic residue for maintaining or improving soil tilth.

Conservation cropping sequences can improve the soil, protect the soil from erosion, help control weeds, insects, and diseases, improve water use efficiency, disrupt the reproductive cycles of diseases, insects, and weeds, and improve wildlife habitat.



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#### *Field windbreak*

A strip or belt of trees, shrubs, or grasses established in, or next to, a field to protect the field against wind erosion.

Field windbreaks can conserve soil moisture, protect soil from wind erosion, provide wildlife habitat, and protect crops and livestock.

#### *Pasture and hayland management*

Maintaining pasture and hayland to enhance desirable species of forage through techniques such as planting, liming, fertilizing, brush control, species selection, and grazing rotation.

Pasture and hayland management can reduce soil erosion and sedimentation, increase forage production, reduce water loss, reduce runoff, and increase infiltration.



### *Field stripcropping*

Growing crops in a systematic arrangement of strips or bands. A strip of grass or close-growing crop is alternated with a clean-tilled crop or fallow strip.

Field stripcropping can reduce soil erosion by water and wind, trap sediment, reduce runoff, and increase infiltration.



### *Grasses and legumes in rotation*

A system of cropping that uses grasses, legumes, or both for a planned number of years.

Grass and legume rotations can reduce soil erosion, help control weeds, disease, and insects, improve the soil, produce forage for hay or silage, reduce runoff, and provide opportunities to use animal wastes.



### *Wetlands management*

Managing natural wetlands to improve water quality, enhance vegetation, and improve hydrology. Natural wetlands should not be discharge areas for pollutants.

Wetlands management can trap sediment, reduce runoff, increase filtration, trap nutrients, and provide habitat for fish and wildlife.



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## Structural Practices

Structural practices are designed and built to control the flow and volume of runoff water. They can increase the infiltration and movement of soluble nutrients and pesticides to below the root zone.

### *Terrace*

An earthen embankment, channel, or combination ridge and channel built across a slope to intercept and store water runoff. Pollutants in terraces may leach into ground water.

Terraces can reduce soil erosion, control and retain runoff, conserve moisture, reduce sediment content in runoff water, and reduce flooding.



### ***Water and sediment control basin***

An earthen embankment that forms a sediment trap and water detention basin. Basins are usually built across minor watercourses. Basins may increase leaching and infiltration.

Water and sediment control basins can reduce watercourse and gully erosion, trap sediment, slow or store runoff, and improve the quality of water downstream.



### ***Diversion***

A grassed channel with a supporting ridge on its lower side. The channel is built across a slope to divert water runoff.

Diversions can prevent gullies, reduce soil erosion, divert excess water runoff to safe outlets, and provide grasses for hay or silage.



### ***Grade stabilization structure***

A structure used to control grades of natural or constructed channels.

Grade stabilization structures can reduce erosion, stabilize the channel grade, prevent gullies, reduce water flow velocities, and trap sediment.



### *Grassed waterway*

A natural or constructed channel—usually broad and shallow—planted with grass to protect soil from erosion by concentrated storm runoff.

Grassed waterways can remove runoff water safely, reduce sediment delivery to

streams, ponds, and lakes, help prevent or heal gullies, provide outlets for diversions and terraces, and provide cover for wildlife.

### *Irrigation system, tailwater recovery*

A facility for collecting, storing, and transporting irrigation tailwater to be reused in your irrigation system.



Tailwater recovery can conserve irrigation water, trap sediment and attached substances, reduce substances in downstream waters, and collect salts, trace elements, soluble nutrients, and soluble pesticides.



### *Water control structure*

A structure in an irrigation, drainage, or other management system that carries water, controls its direction and rate of flow, or maintains a desired water surface elevation.

Water control structures can control distribution of water, help regulate water tempera-

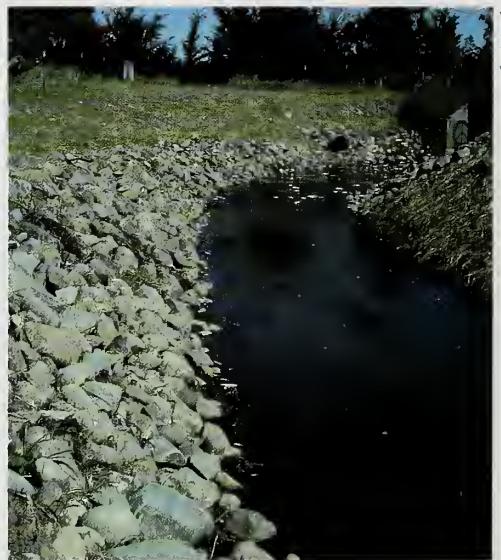


ture, reduce channel bank erosion, reduce sediment, and protect fish and wildlife.

### *Streambank and shoreline*

Vegetation protection or structures that stabilize and protect the banks of streams, lakes, and estuaries. They also protect excavated channels from scour and erosion.

Streambank and shore protection can prevent land loss and damage, maintain channel capacity, reduce sediment loads, control channel meander, and protect property along watercourses.



### *Wetland development or restoration*

Building or restoring wetlands to provide hydrological and biological benefits.

Wetland development and restoration can reduce flooding, trap sediment and attached substances, provide ground water recharge, recycle nutrients, and provide wildlife habitat.



### *Agrichemical storage, handling, and disposal*

Using structures to reduce farmstead contamination caused by storage, handling, and washdown of agrichemicals and fertilizers.

Agrichemical storage, handling, and disposal structures can provide for effective dis-

posal of excess chemicals and containers, hold agrichemicals and fertilizers, hold wash water from transport and spreading equipment, and reduce spill contamination.



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Conservation Practices Summary Guide		Resource Concerns Surface Water Quality										Ground Water Quality	
		Salinity	Temperature	Sediment	Soluble Nutrients	Adsorbed Nutrients	Soluble Pesticides	Adsorbed Pesticides	O <sub>2</sub> -Demanding Sub's	Pathogens	Nutrients	Pest. Loss to Grd. Wtr.	
<b>I. Management Practices</b>													
Nutrient management		●	●	●	▲	▲	●	●	●	●	▲	●	
Integrated pest management (IPM)		●	●	●	●	●	▲	▲	●	●	●	●	▲
Irrigation water management		▲	●	▲	▲	▲	▲	▲	●	●	●	●	●
Regulating water in drainage systems		●	●	●	●	●	●	●	●	●	●	●	●
Soil salinity management		▲	●	●	●	●	●	●	●	●	●	●	●
Water table control		●	●	●	●	●	●	●	●	●	●	●	●
Agricultural waste management**		●	●	●	●	●	●	●	●	●	●	●	●
Runoff management system**		●	●	●	●	●	●	●	●	●	●	●	●
<b>II. Vegetative and Tillage Practices</b>													
Conservation tillage		●	●	▲	●	▲	●	●	●	●	●	●	●
Contour farming		●	●	▲	●	●	●	●	●	●	●	●	●
Contour stripcropping		●	●	●	●	●	●	●	●	●	●	●	●
Filter strip		●	●	●	●	●	●	●	●	●	●	●	●
Field border		●	●	●	●	●	●	●	●	●	●	●	●
Cover and green manure crop		●	●	●	●	●	●	●	●	●	●	●	●
Conservation cropping sequence		●	●	▲	●	●	●	●	●	●	●	●	●
Field windbreak		●	●	●	●	●	●	●	●	●	●	●	●
Pasture and hayland management		●	●	●	●	●	●	●	●	●	●	●	●
Field stripcropping		●	●	●	●	●	●	●	●	●	●	●	●
Grasses and legumes in rotation		●	●	●	●	●	●	●	●	●	●	●	●

Conservation Practices Summary Guide	Resource Concerns Surface Water Quality										Ground Water Quality
	Salinity	Temperature	Sediment	Soluble Nutrients	Absorbed Nutrients	Soluble Pesticides	Absorbed Pesticides	O <sub>2</sub> -Demanding Sub's	Pathogens	Nutrients	
<b>III. Structural Practices</b>											
Terrace	▲	▲	▲	●	▲	●	▲	●	●	▲	▲
Water and sediment control basin	●	▲	▲	●	▲	●	▲	●	●	▲	▲
Diversion	●	▲	●	●	●	●	●	●	●	●	●
Grade stabilization structure	●	●	●	●	●	●	●	●	●	●	●
Grassed waterway	●	●	●	●	●	●	●	●	●	●	●
Irrigation system, tailwater recovery	▲	▲	▲	▲	▲	▲	▲	●	●	▲	▲
Water control structure	●	▲	▲	●	▲	●	●	●	●	●	●
Streambank and shoreline protection	●	●	▲	●	▲	●	●	●	●	●	●
Wetland development or restoration	●	●	●	●	●	●	●	●	●	▲	●
Agrichemical storage, handling, and disposal	●	●	●	●	●	●	●	●	●	▲	▲

Note: Because of the general nature of this chart, there may be situations and sites where practices will not perform as indicated.

\* Includes all appropriate structural, vegetative, and management practices.

\*\* Depends on soil, crop, practice design, and management characteristics.

# A Glossary of Water Quality Factors

## *Adsorbed nutrients*

Elements or compounds essential for plant growth. They adhere to the surfaces of solids such as soil particles and organic matter.

## *Adsorbed pesticides*

Chemical agents used to control pests, insects, weeds, and diseases. They adhere to the surfaces of solids such as soil particles and organic matter.

## *Nutrients*

Elements or compounds essential for plant growth. These include commercial fertilizers, animal wastes, and soil minerals.

## *Oxygen-demanding substances*

Organic material that needs oxygen for its biochemical degradation.

## *Pathogens*

Organisms that cause disease.

## *Pesticide loss to ground water*

The movement of pesticides into ground water.

## *Salinity*

The concentration of dissolved solids or salt in water.

## *Sediment*

Solid mineral and organic material held in suspension, transported, or moved by air, water, gravity, or ice during erosion.

## *Soluble nutrients*

Elements or compounds essential for plant growth capable of dissolving in a liquid.

## *Soluble pesticides*

Chemical agents for pest control capable of dissolving in liquids.

## *Temperature*

Degree of hotness or coldness measured on a definite scale. Temperature affects biological and chemical activity in soil and water.

## *Trace elements*

Naturally occurring elements and minerals that, when concentrated, are toxic to plant and animal life. Selenium and arsenic are naturally occurring toxins.

*All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.*

*Revised September 1993*

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